

## FUMIGANTS AND NONFUMIGANTS FOR REPLACING METHYL BROMIDE IN TOMATO PRODUCTION.

**D. W. Dickson\***. Department of Entomology and Nematology, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611-0620.

Two formulations of 1,3-D + chloropicrin (1,3-D + 17% chloropicrin (pic) at 327 L/ha; 1,3-D +35% pic at 112, 168, and 224 L/ha), pic (263 kg/ha), oxamyl (1.1 kg/ha), and querbracho tannin (50 kg/ha preplant and 271 kg/ha via drip) were compared with methyl bromide 67-33 (MBr) at 392 kg/ha as possible alternatives for control of root-knot nematodes, soilborne diseases, and weeds on tomato grown in drip irrigated polyethylene mulch culture in Florida. The experiment was conducted in 1997 at the Agronomy Research Farm, University of Florida, Gainesville. The sod was an Arredondo fine sand (>92%) and infested with a high density of *Meloidogyne incognita* (southern root-knot nematode). The site also was infested with *Sclerotium rolfsii* (southern stem blight), and *Cyperus rotundus* (purple nutsedge) and *C. esculentus* (yellow nutsedge). In addition, one of six blocks of the test site was infested with *Pseudomonas solanacearum* (bacterial wilt). The winter cover crop was rye, which was mowed, plowed under, and the field disked 6 weeks before treatments were applied. Plots, single row, 9.1 m long on 1.8 m centers with a 0.91-m bed width, were arranged in a randomized complete block and replicated six times. Beds were formed with disk hillers and a starter fertilizer (10-10-10 NPK) was applied and incorporated. Pebulate (4.5 kg/ha) was applied preplant and incorporated 10 cm deep for nutsedge suppression. Methyl bromide, pic, and 1,3-D + pic (17% and 35%) were injected 30 cm deep with three chisels spaced 30 cm apart over preformed beds 20 days preplant with a bed-press mulch laying machine (Kennco Mfg., Ruskin, FL), and covered immediately with black polyethylene mulch. Oxamyl was applied weekly (10 applications), biweekly (5 applications), and triweekly (4 applications); and querbracho tannin was applied preplant in a pelleted formulation at 50 kg/ha, and weekly (5 applications) at 271 kg/ha via drip irrigation beginning 6 days after transplanting. All plots were drip irrigated twice daily and fertilized via drip tubes weekly.

All of the treatments except oxamyl applied triweekly and tannin resulted in increased total marketable yields over the control ( $P \leq 0.05$ ). Relative marketable fruit yields were 100% for MBr, 91 to 93% for 1,3-D 35% pic at 112 and 168 L/ha, 86% for 1,3-D 17% pic, 83 to 84% for oxamyl biweekly and 1,3-D 35% pic at 224 L/ha, 77 to 78% for oxamyl weekly and pic, and 55 to 65% for tannin, oxamyl triweekly, and the control. Since MBr was the only product to suppress bacterial wilt and there was a significant block effect caused by this organism, the data also was subjected to analysis omitting block 6. In this case all the treatments except tannin resulted in higher yields than the untreated control ( $P \leq 0.05$ ). The relative marketable fruit yields were 100% for MBr, 97 to 101% for three rates of 1,3-D 35% pic, 92 to 94% for oxamyl weekly, biweekly, and 1,3-D 17% pic, 79% to 85% for oxamyl triweekly and pic, and 60 to 66% for tannin and the control. Two treatments (oxamyl weekly and biweekly) resulted in higher numbers of extra-large fruit ( $P \leq 0.05$ ). This difference was large, averaging 9.5 kg/plot greater than in any other treated plots. The smallest number of extra-large fruit was in plots treated with pic. The lowest root-knot nematode galling index (GI), which is based on a 0 = no galls, 1 = 10% of root system galled.... to 10 = 100% of root system galled, was in soil treated with MBr (GI = 0.7). The next lowest galling indices were in plots treated with 1,3-D 17% pic (GI = 3) and 1,3-D 35% pic (GI = 3.8 to 4.1), followed by oxamyl weekly and biweekly (GI = 4.4 to 5.1), pic (GI = 5.6), oxamyl triweekly (GI = 6.8), tannin (GI = 7.3 and 8.6), and the control (GI = 8.3). No attempt was made to separate wilt induced by *S. rolfsii* vs. *P. solanacearum* however with the exception of the MBr plots nearly all the plants in block 6 were infected with bacterial wilt. In summary, with the presence of bacterial wilt, MBr was the only treatment to perform consistently among all plots. The next best treatment, 1,3-D + 35% pic was only 91 to 93% as effective. If the block effect caused by bacterial wilt was removed then the yield of 1,3-D + 35% pic at 112, 168, and 224 L/ha, was equal to MBr.

Treatments with oxamyl weekly or biweekly resulted in high numbers of extralarge fruit for the third harvest. MBr was the only product to consistently suppress rootknot nematode galling throughout the season. The next best treatment, 1,3-D + 17% or 35% pic resulted in gall ratings of 3 to 4, which would definitely make double cropping difficult. It appears that 1,3-D + 35% pic is superior to 1,3-D + 17% pic, however more research is needed to separate the most effective dosage of the 35% material.